TECHNICAL SPECIFICATION

ISO/TS 17425

First edition
2016-05-15

Intelligent transport systems — Cooperative systems — Data exchange specification for in-vehicle presentation of external road and traffic related data

Systèmes intelligents de transport — Systèmes coopératifs — Spécifications d'échange des données pour la présentation dans le véhicule de la route externe et des données relatives au trafic

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Reference number
ISO/TS 17425:2016(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

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Introduction

Traditional fixed road signs are positioned on road verges to inform drivers about the applicable regulations, or to warn them about dangers or to provide them with other general information – this can be considered as roadside signage information. Beyond this fixed signage, the newer technologies have now allowed for some time for more accurate dynamic presentation of roadside signage information depending on the actual road and environmental conditions using variable or dynamic message signs. With the advent of Cooperative Intelligent Transport Systems (C-ITS) it is possible to provide more focused and timely guidance to vehicle controllers and drivers by supporting continuous presentation of the content of roadside signage information in the vehicle along the impacted road section rather only during the short moments its takes for a vehicle to pass traditional road signs. Direct in-vehicle presentation of roadside signage information, called In-Vehicle Signage, facilitates the potential provision of information to specific classes or characteristics of vehicles, and for potentially more granular definition of affected road sections than stationary-position traditional fixed plate signs and use of variable/dynamic road signs. It does not deal with contextual speeds which are covered by ISO/TS 17426.

Delivering the In-Vehicle Signage service to road users can improve road safety, support traffic management, and reduce greenhouse gas emissions. It does not preclude other usage of the delivered information but such services are not in the scope of this Technical Specification.

All ITS services follow the same abstract process structure consisting of a sequence of detection (of an event) including pre-processing of the detected content, execution of the service algorithm (processing of detected content), and presentation or utilization of the service result. Figure 1 (extracted from ISO/TS 17427) summarizes and details this process structure.

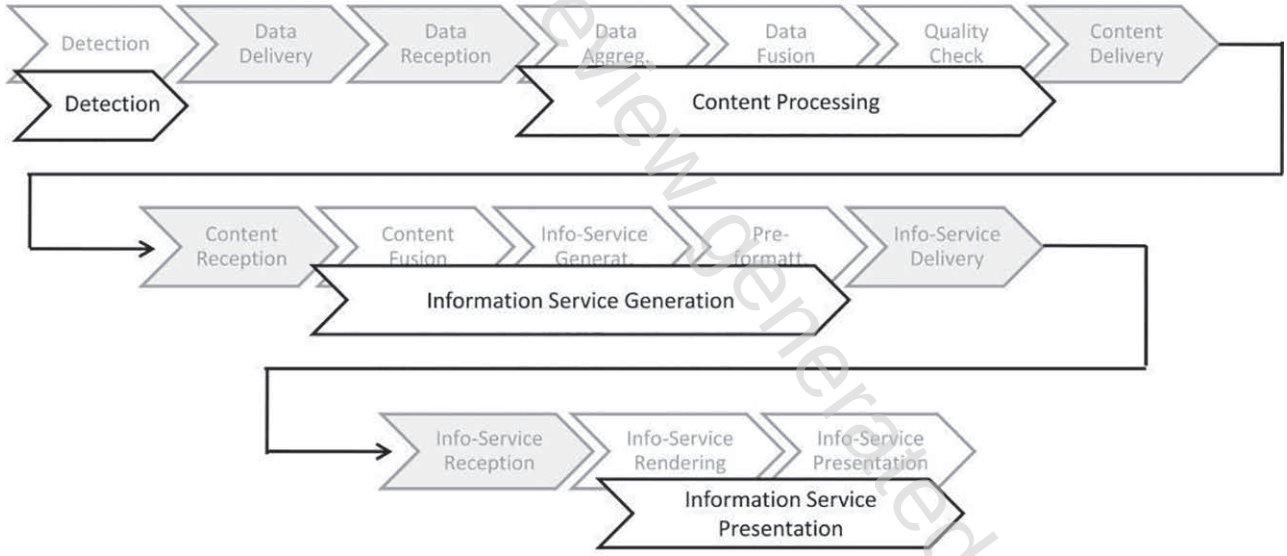

Figure 1 — General description of process for In-Vehicle Signage (from ISO/TS 17427:2014, Annex A)

Based on this abstract and general description of process steps in an ITS service, a large number of possible scenarios can be derived. This is true for In-Vehicle Signage. Every step in the process chain can be executed by different actors or stakeholders. Additionally, the execution of a process step for different spatial areas may be delivered by different actors. Each combination of different actors for different process steps can be used to identify distinct scenarios.

Assuming that there are two main stakeholder groups in C-ITS, the Infrastructure stakeholder and the Vehicle stakeholder, multiple combinations, and therefore multiple scenarios, are possible as every step might be delivered by either stakeholder group (see Figure 2) or shared between both stakeholder groups (see Figure 3).

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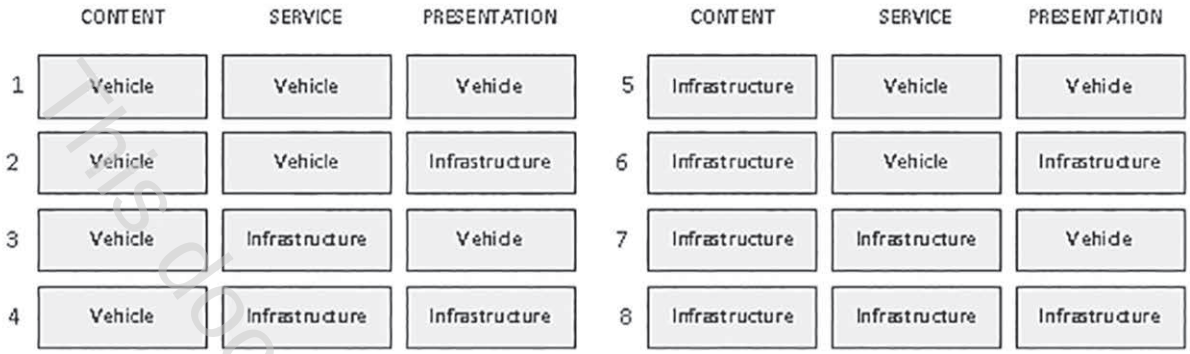

Figure 2 — Possible scenarios — Simple combinations

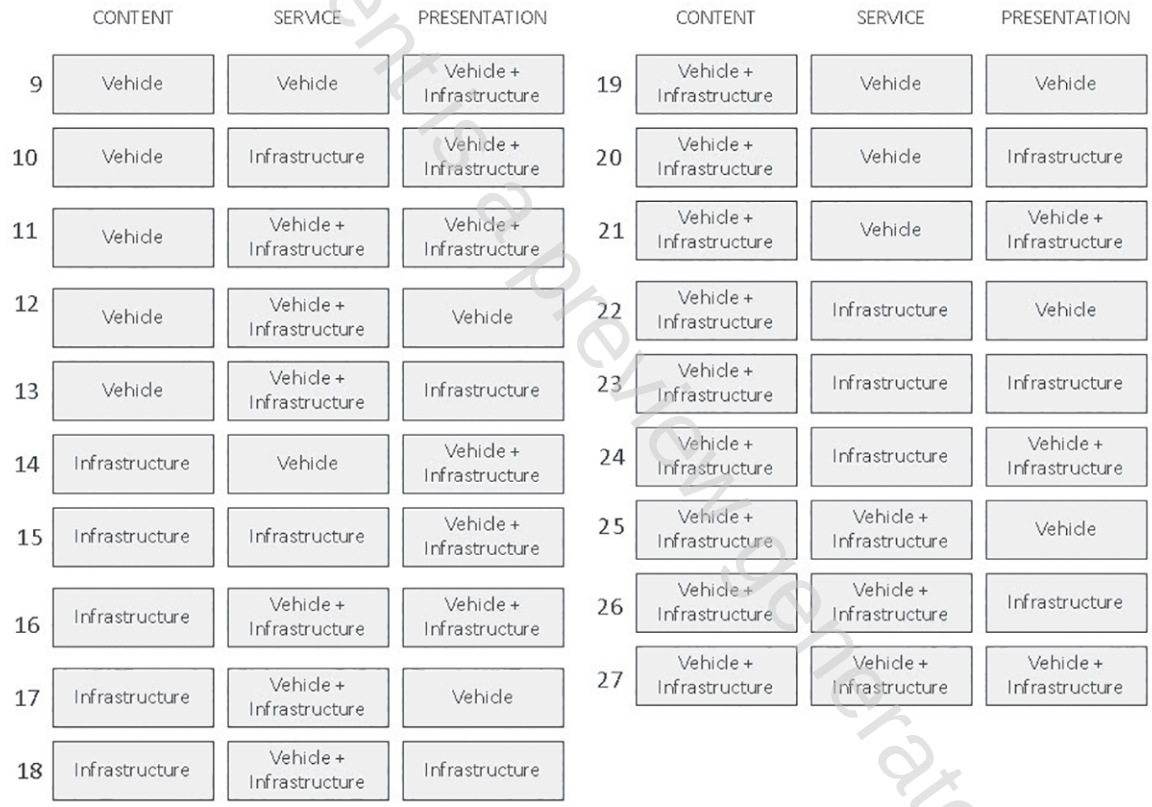

Figure 3 — Possible scenarios — Complex combinations

Every scenario is one specific of combination of stakeholders executing process steps. This Technical Specification addresses the scenarios where detection, content pre-processing, and the information service generation (see Figure 1) are delivered under the responsibility of the infrastructure stakeholder group (scenario 7 as seen in Figure 2). In scenario 7, the information service presentation takes place in the vehicle. Scenario 7 is considered in detail in this Technical Specification.

The defined C-ITS applications rely on the functionality and procedures defined within the Communications Architecture and by the reference ITS station architecture (as defined in ISO 21217 and other International Standards or Technical Specifications from the C-ITS standard set).

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Annex A and Annex B contain profiles that define an instantiation for the IVS service. Annex A and Annex B contain conditional mandatory requirements. There is no need to comply with these requirements to claim compliance with this Technical Specification.

Annex A contains a profile that is communication technology agnostic. Annex B contains a profile that is focused on ITS-G5. For details on the referenced standards, see the introduction of the corresponding Annex.

These profiles are expected to be implemented and validated in European initiatives. Based on the results of these initiatives, it is intended to specify one interoperable solution in a future version of this Technical Specification.

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Intelligent transport systems — Cooperative systems — Data exchange specification for in-vehicle presentation of external road and traffic related data

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1 Scope

This Technical Specification specifies the In-Vehicle Signage service and application that delivers In-Vehicle Signage information to ITS stations (vehicle ITS stations or personal ITS stations devices) concerning road and traffic conditions, qualified by road authorities/operators, in a consistent way with road authority's/operator's requirements, in the manner that is coherent with the information that would be displayed on a road sign or variable message sign (VMS).

NOTE A Variable Message Sign is also named dynamic message sign. Both terms are considered as synonyms and can be used interchangeably. In the text below, only variable message sign and its abbreviated term VMS are used.

This Technical Specification defines the following:

— the In-Vehicle Signage service and the In-Vehicle Signage application that instantiates this ITS service;

— the requirements to be fulfilled by the In-Vehicle Signage service;

— the requirements for using functions provided by the ITS station facilities layer supporting the use of the In-Vehicle Signage service;

— the ITS-S application processes in the different ITS station, that instantiate the In-Vehicle Signage ITS service.

This Technical Specification also specifies: the sets of communication requirements and objectives (profiles) using the methods defined in ISO/TS 17423 to select the level of performance (best effort or real-time, etc.), confidence and security (authentication, encryption, etc.) for each communication flow between ITS stations in the scope of the In-Vehicle Signage service.

This Technical Specification defines the selection of relevant functions and procedures provided by the ITS station facilities layer (ISO/TS 17429) and defines the message structure, content, syntax, atomic elements to be used by the In-Vehicle Signage application.

NOTE This application is colloquially called "In-Vehicle Signage".

The In-Vehicle Signage service includes the on-board information management. This management ensures contextual coherence of the end-user ITS service (e.g. vehicle characteristics, message priority, etc. avoiding amongst others things the presentation of conflicting information to end-users).

The production of information supporting the In-Vehicle Signage application, its qualification, and its relevance are out of the scope of this Technical Specification.

This Technical Specification does not specify the design of in-vehicle Human Machine Interfaces (HMI), but it does specify requirements that such interfaces shall be capable of supporting in order to permit the correct dissemination and use of information provided by the In-Vehicle Signage service.

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2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 639-1, *Codes for the representation of names of languages — Part 1: Alpha-2 code*

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

ISO 21217, *Intelligent transport systems — Communications access for land mobiles (CALM) — Architecture*

ISO/TS 14823, *Traffic and travel information — Messages via media independent stationary dissemination systems — Graphic data dictionary for pre-trip and in-trip information dissemination systems*

ISO/TS 16951, *Road vehicles — Ergonomic aspects of transport information and control systems (TICS) — Procedures for determining priority of on-board messages presented to drivers*

ISO/TS 17423, *Intelligent transport systems — Cooperative systems — ITS application requirements and objectives for selection of communication profiles*

ISO/TS 17429, *Intelligent transport systems — Cooperative systems — Profiles for processing and transfer of information between ITS stations for applications related to transport infrastructure management, control and guidance*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21217, ISO/TS 17423, ISO/TS 17429, and the following apply.

3.1
additional service
IVS service able to deal with the lower levels of message priority

3.2
communication authority
entity in charge of regulating telecommunications and/or broadcast services

3.3
core service
IVS service able to deal with the two highest levels of message priority

3.4
driver awareness zone
DAZ
parts of road network on which a message is present to inform drivers about upcoming situations

3.5
HMI control unit
in-vehicle device that manages prioritisation and presentation of messages designed for consumption by vehicle occupants

3.6
in-vehicle signage
in-vehicle signage service
IVS
ITS service that provides receiving ITS stations in order to inform drivers about static as well as dynamic road signs and variable message signs

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